CLAIMS

WE CLAIM AS OUR INVENTION:

1. An apparatus for at least partially normalizing an axial flow velocity distribution of a flow of cooling air supplied by a fan to a locomotive dynamic braking grid resistor stack, the apparatus comprising a flow turning vane disposed in a flow of cooling air downstream of a fan and upstream of a resistor stack, the flow turning vane oriented within the flow of cooling air to direct a portion of the cooling air from a relatively higher velocity portion of the flow of cooling air into a relatively lower velocity portion of the flow of cooling air.

2. The apparatus of claim 1, wherein the flow turning vane comprises an annular member having a length along an axis of the flow of cooling air and having an inside diameter dimension perpendicular to the axis that decreases along the axis in the direction of the airflow for directing a portion of the cooling air from a relatively higher velocity annular portion of the flow of cooling air into a relatively lower velocity center portion of the flow of cooling air.

3. The apparatus of claim 1, further comprising:

a duct bounding the flow of cooling air; and

the flow turning vane comprising a corner member disposed proximate a corner of the duct for directing a portion of the cooling air from a relatively higher velocity annular portion of the flow of cooling air into a relatively lower velocity corner portion of the flow of cooling air.

4. The apparatus of claim 3, wherein the flow turning vane comprises a V-shaped member disposed proximate the corner.

5. The apparatus of claim 1, further comprising:

a duct bounding the flow of cooling air;

a first flow turning vane comprising an annular member disposed within the duct for directing a portion of the cooling air from a relatively higher velocity annular portion of the flow of cooling air into a relatively lower velocity center portion of the flow of cooling air; and

a second flow turning vane comprising a corner member disposed proximate a corner of the duct for directing a portion of the cooling air from the relatively higher velocity annular portion of the flow of cooling air into a relatively lower velocity corner portion of the flow of cooling air.

6. The apparatus of claim 5, wherein the corner member is connected to the duct and the annular member is connected to the corner member.

7. The apparatus of claim 1, further comprising:

a first flow turning vane disposed in the flow of cooling air upstream of the resistor stack; and

a second flow turning vane disposed in the flow of cooling air downstream of the first flow turning vane and upstream of the resistor stack.

8. A cooling apparatus for a locomotive dynamic brake resistor grid stack, the cooling apparatus comprising:

a fan for inducing a flow of air having a cross-section with a relatively higher velocity area and a relatively lower velocity area;

a duct for directing the flow of air away from the fan to an inlet of a locomotive dynamic brake resistor grid stack; and

a flow directing diffuser disposed within the duct for directing a portion of the flow of air from the relatively higher velocity area into the relatively lower velocity area to at least partially normalize a flow velocity distribution of the air entering the inlet of the grid stack.

9. The cooling apparatus of claim 8, wherein the fan comprises a mixed flow fan.

10. The cooling apparatus of claim 8, wherein the further flow directing diffuser comprises a first annular flow directing vane disposed within the duct for directing a portion of the flow of air from a relatively higher velocity annular area to a relatively lower velocity center area of the duct.

11. The cooling apparatus of claim 10, further comprising a second annular flow directing vane disposed within the duct upstream of the first annular flow directing vane and cooperating with the first annular flow directing vane to direct the portion of the flow of air from the relatively higher velocity annular area to the relatively lower velocity center area of the duct.

12. The cooling apparatus of claim 8, further comprising a corner vane member disposed within the duct for directing a portion of the flow of air from a relatively higher velocity annular area to a relatively lower velocity corner area of the duct.

13. A locomotive dynamic braking grid package comprising:

a plurality of electrical resistors packaged in a grid stack;

a fan for producing a flow of cooling air;

a duct for directing the flow of cooling air from the fan to the grid stack for cooling the plurality of electrical resistors; and

a flow turning vane disposed within the duct for directing a portion of the cooling air from a higher axial velocity area into a lower axial velocity area of the duct to at least partially normalize an axial flow velocity profile of the cooling air as it enters the grid stack.

14. The locomotive dynamic braking grid package of claim 13, wherein the fan comprises a mixed flow fan.

15. A locomotive dynamic braking grid package comprising:

a plurality of electrical resistors packaged in a grid stack;

a mixed flow fan for producing a flow of cooling air; and

a duct for directing the flow of cooling air from the fan to the grid stack for cooling the plurality of electrical resistors.

16. The locomotive dynamic braking grid package of claim 15, further comprising an annular flow turning vane disposed within the duct for directing a portion of the cooling air from a higher axial velocity annular area into a lower axial velocity center area of the duct to at least partially normalize an axial flow velocity profile of the cooling air as it enters the grid stack.

17. The locomotive dynamic braking grid package of claim 16, further comprising a corner vane member attached between the annular flow turning vane and the duct for directing a portion of the flow of air from the relatively higher velocity annular area to a relatively lower velocity corner area of the duct.

18. The locomotive dynamic braking grid package of claim 15, further comprising:

a first annular flow turning vane disposed within the duct for directing a portion of the cooling air from a higher axial velocity annular area into a lower axial velocity center area of the duct; and

a second annular flow turning vane disposed within the duct downstream of the first annular flow turning vane and cooperating with the first annular flow turning vane to direct the portion of the cooling air from the higher axial velocity annular area into the lower axial velocity center area of the duct to at least partially normalize an axial flow velocity profile of the cooling air as it enters the grid stack.